Proisotoma filifera Denis in Holland, with a note on its classification (Collembola, Isotomidae)

by

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Through the courtesy of Mr. G. HOUTMAN I received a large sample of Collembola from a greenhouse at Heerhugowaard (prov. of North Holland) about November 1968.

The material was collected in a cucumber greenhouse of Mr. J. HUIBERS Kzn, and occurred in such numbers that the springtails formed grey patches on the ground. The soil of this glasshouse is regularly steamed.

The material consisted of but one species, doubtless a *Proisotoma*. But, although highly characteristic by its reduced eye-number, short dens with dorsal tubercles and bidentate, strongly lamellate mucro, it was not identifiable with the existing keys to the European Collembola. It keyed out close to *P. richardi* Denis, 1924, described from Monaco. This species, however, has among other differences, 5+5 ocelli, instead of 6+6 as in the present species.

A search in the literature revealed the identity of the material with *P. filifera* Denis, 1931, described from Costa Rica, and refound by WINTER, 1964, among material from Peru.

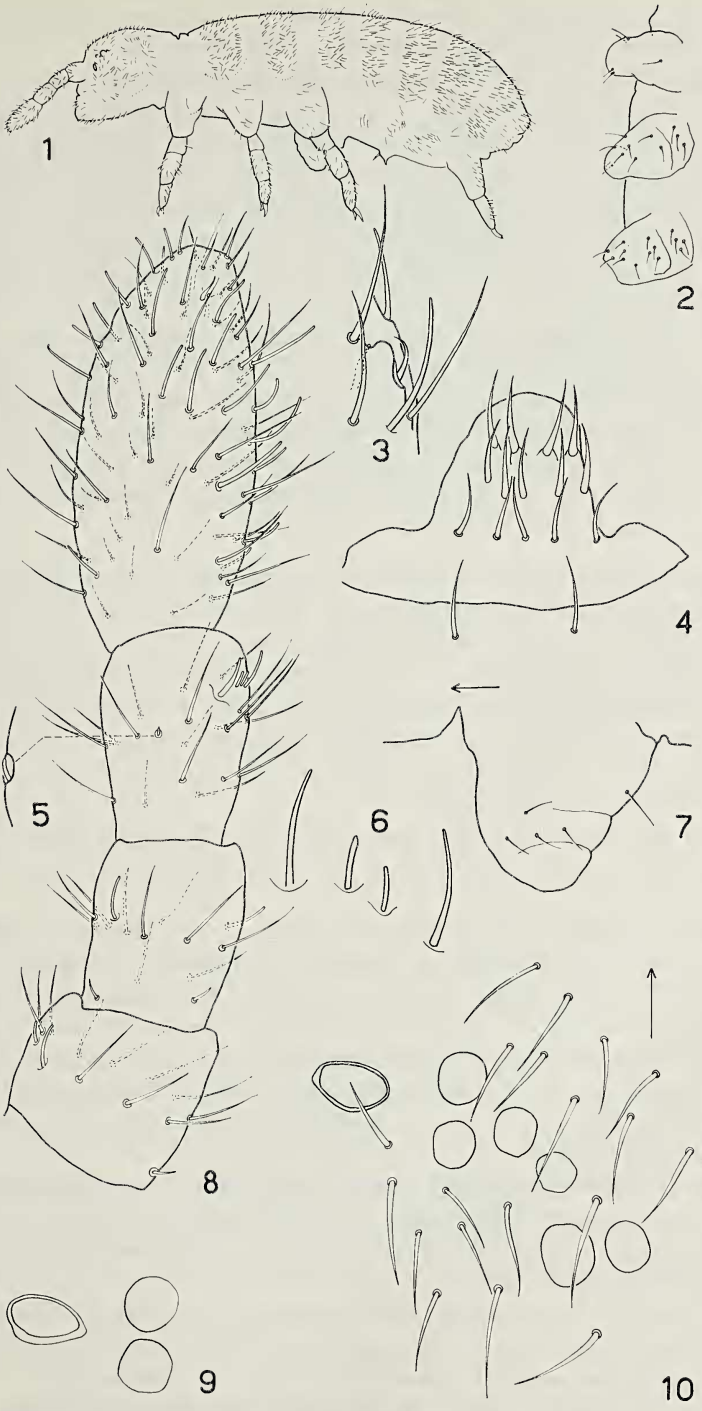
It is clear that *filifera* is an immigrant in the Netherlands. The genus *Proisotoma* Börner, 1901, presents numerous cases of such mass eruptions in synanthropic environments, far from its original area.

In order to substantiate my identification, and to give some additions to the elaborate description by WINTER, I add a short description and some drawings.

Total length 0.67 mm. Habitus stout, typical for the genus (fig. 1). Body shortly hairy. Abdominal segments V and VI not ankylosed. Greyish-blue pigment dispersed irregularly over the whole body, feet, furca and antennae; hind margin of body segments and head capsule somewhat more darkened. Eye-patch black.

Eyes 6+6, all equally large except d which is slightly smaller (fig. 10). Postantennal organ about 1.5 times omma a, rather broad, with a solid rim which is somewhat irregularly thickened (figs 9, 10). Labral chaetotaxy 2/5, 5, 4, the two distal rows composed of thickened setae on low papillae (fig. 4). Labium with a small number of setae (fig. 14).

Antennae short, 0.8 times head diagonal (fig. 8). Sensory hairs not strongly differentiated. Antennal segment 1 with two sensory hairs and a small spine. Segment 2 with two sensory hairs and two small spines. Segment 3 without apparent sensory hairs, with a small spine-like sensilla in a groove (fig. 5) and the ant. org. III. This is composed of two rather slender rods in shallow grooves accompanied by two sensory hairs (fig. 6). Antennal segment 4 with numerous setae and sensory hairs and a small sensilla in a deep pit, accompanied by a spine-like seta. This sensilla is prolonged in an interior tube-like structure (fig. 3). WINTER, 1967, moreover mentioned and figured for *P. centralis* Denis, *P. filifera* and two other



Figs 1—10. *Proisotoma* (*Clavisotoma*) *filifera* Denis, 1931. 1, habitus; 2, coxae; 3, subapical sensilla of antennal segment 4 with accompanying structures; 4, labrum; 5, sensilla of antennal segment 3; 6, antennal organ III; 7, ventral tube; 8, antenna; 9, postantennal organ; 10, eyepatch.

species an apical "dornartig ausgezogene Papille". I could not find anything comparable to this structure. It is not mentioned by DENIS either.

Feet short, tibiotarsus with incompletely demarcated distal subsegment. No clavate tibiotarsal tenent hairs present. Unguis without dorsal and lateral teeth, provided with an inner tooth; interior lamella basally notched. Unguiculus with a terminal filament and a broad inner lamella (fig. 13). Retinaculum quadridentate, with one seta on the corpus; in some specimens two setae were seen on the corpus, one in front of the other. Ventral tube with 4+4 lateral setae and 1+1 posterior seta (fig. 7). Female genital aperture without special structures, male genital pore not well studied.

Length of manubrium: dens: mucro = 37:25:14. Manubrium with numerous posterior setae, without anterior setae. Dens with about 8 ill-defined posterior integumentory swellings, 16 to 17 posterior setae, and 2 antero-distal ones. Mucro large, with an apical tooth and an apparent subapical tooth, formed by the junction of two well-developed lateral lamellae. Corpus of mucro elevated in a medioposterior lamella. Between apical and subapical tooth sometimes an indistinct elevation is visible in profile (figs 11, 12).

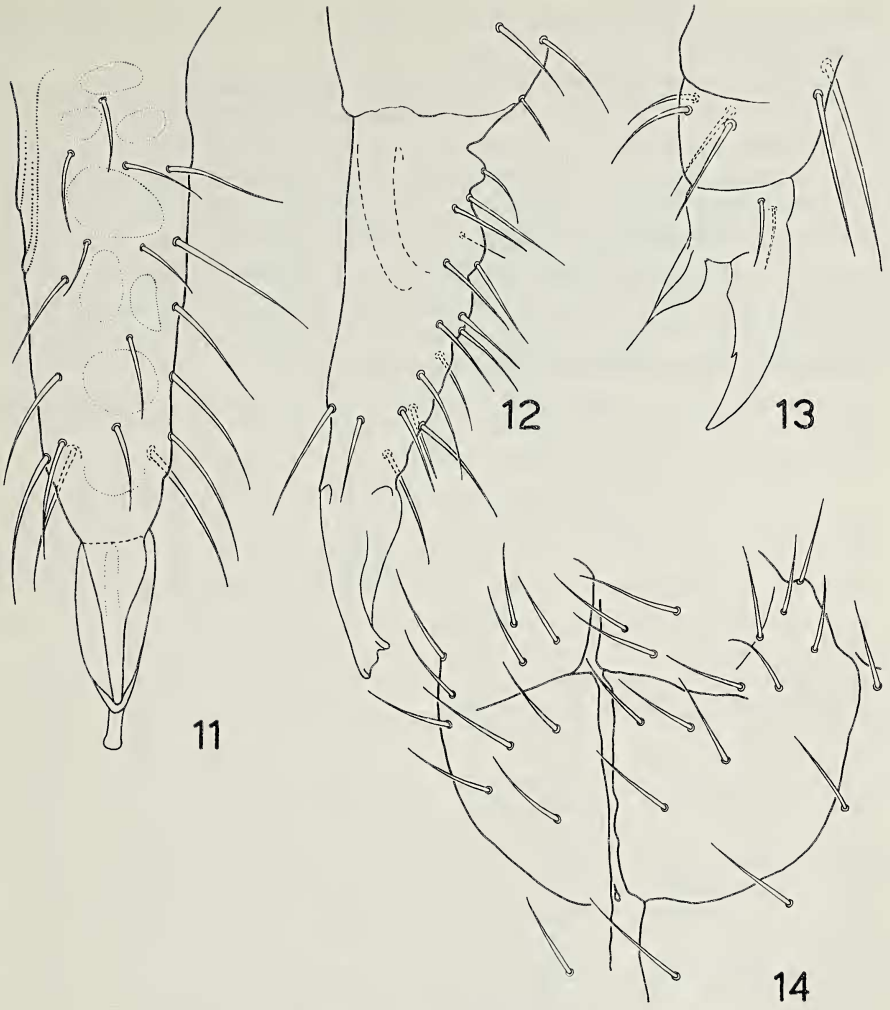
Proisotoma filifera belongs to a species group within this large genus which is fairly well characterized by the following set of characters: body stout, dens short, posteriorly with a few large tubercles ("humps") and about 5—20 setae, anteriorly with a few hairs in distal position; mucro large, bidentate, strongly lamellate, well separated from dens; manubrium without anterior setae; abdominal segments v and vi not ankylosed. Variable are the number of ocelli and retinacular teeth, presence or absence of clavate tibiotarsal tenent hairs, an internal tooth to the mucro and a terminal filament to the unguiculus.

Evidently this same species group was recognized by DELAMARE DEBOUTTEVILLE, 1953, as is clear from his discussion of the relationships of *P. excavata* Folsom, 1937.

The same conclusion was drawn by YOSII, 1966, in connection with a find of *P. fitchioides* Denis, 1947 in Burma. He transferred this species to the genus *Subisotoma* Stach, 1947. Consequently, the circumscription of this genus had to be altered. YOSII redefined *Subisotoma* sensu novo as follows: labral chaetotaxy 2/5,5,4, anterior two rows papillate; ventral tube anteriorly without setae; postantennal organ small and simple; tenent hairs absent or present; dentes dorsally granular with integumentary swellings and few setae, ventrally with one seta only; mucro bidentate with lamellar margins.

Evidently, *Subisotoma* sensu YOSII comes rather near the group as defined above by me. But I cannot accept YOSII's solution, as his diagnosis of *Subisotoma* excludes *S. pusilla* (Schäffer, 1900), the type of the genus, especially as regards the dental tubercles and the lamellate mucro.

Central European representatives of the group are *P. borealis* (Axelson, 1905), *P. hankoi* Stach, 1929, and *P. tuberculata* Stach, 1947. PALISSA, [1964], united these species, together with *Subisotoma pusilla* in his new subgenus of *Proisotoma, Clavisotoma*. Key character of this subgenus is the presence of clavate tenent hairs on the tibiotarsus. Contrary to the opinion of PALISSA, I am convinced that here as in most Isotomidae groups, this character has no generic value.



Figs 11—14. *Proisotoma (Clavisotoma) filifera* Denis, 1931. 11, dens in posterior view; 12, dens in external view; 13, claw of P_3; 14, labium.

The status of *Clavisotoma* is the more open, as its author did not designate a type species. Selection of *pusilla* as such would result in an objective synonymy of *Clavisotoma* with *Subisotoma.* However, I think it useful to save *Clavisotoma,* although in a modified sense. I therefore propose to designate *Proisotoma tuberculata* Stach, 1947, as type-species. Moreover, I propose to modify the diagnosis of the subgenus to the above-mentioned set of characters.

In many respects *Clavisotoma* is intermediate between *Proisotoma* s. str. and *Ballistura* Börner, 1906. *Proisotoma (P.) woodgeri* Rapoport & Maño, 1969, for instance comes rather close to *Clavisotoma,* as does *Ballistura ewingi* (Folsom, 1937). Whether *Clavisotoma* has to be a distinct genus or a subgenus to *Proisotoma* is largely a matter of taste. There is a mental evolution towards separate genera in

this group; nevertheless, I would prefer to give *Clavisotoma* a conservative start, i.e. as a subgenus.

In addition to the discussion on *Clavisotoma,* it is necessary to make some remarks on the status of the genus *Varisotoma* Salmon, 1964. This genus was created to accomodate the species of *Proisotoma* sensu lato having a reduced number of ocelli. SALMON included three species in this genus, viz. *Subisotoma angularis* (Axelson, 1905), *Proisotoma (P.) minima* (Absolon, 1901) and *Proisotoma decemoculata* (Stscherbakow, 1899), nec Folsom, 1937. Of these three species *decemoculata* is so unsufficiently described that it is impossible to have a clear idea of its taxonomic status whatsoever. The other two species are well known and so abundantly different, that the single point of their reduced eye number does not, in my opinion, warrant their location in the same genus.

On the basis of their reduced eye number, a good deal of the species belonging

		number of tibiotarsal tenent hairs	number of retinacular teeth	presence/absence of internal tooth unguis	presence/absence of terminal filament unguiculus
Ocelli 8 + 8	Origin				
nilgiris Denis, 1937	India	3	4	+	0
sjoestedti Wahlgren, 1910	Kilimandjaro	2	?	+	0
tuberculata Stach, 1947	C. Europe	1	3	0	0
palustris Cassagnau, 1959	France	0	3	0	0
veletensis Steiner, 1959	Spain	1	3	0	0
hankoi Stach, 1929	Hungary	1	3	0	0
yosii Stach, 1947	Japan	0	0	0	0
lamelligera Börner, 1929	Japan	2	?	0	0
fitchioides Denis, 1947	India	122	3	0	0
————, Yosii, 1966	Burma	2	3	0	0
fitchi Denis, 1934	Costa Rica	1	3	0	0
borealis (Axelson, 1905)	Sweden	2	4	0	0
inaequalis (Schäffer, 1898)	Bismarck Arch.	1	4?	0	0?
Ocelli 6 + 6					
laticauda Folsom, 1937	USA, Mass.	0	3	+	+
filifera Denis, 1931	Costa Rica	0	?	+	+
————, Winter, 1967	Peru	0	4	+	+
fatonei Rapoport, 1959	Argentina	0	4	+	+
africana Womersley, 1934	S. Africa	0	4	+	+
excavata Folsom, 1937	USA, Florida	0	4	0	+
————, Delamare, 1953	Kilimandjaro	0	4	0	+
sexophthalma Womersley, 1934	Australia	0	?	0	+
brisbanensis Womersley, 1935	Australia	1	?	0	+
sundana Handschin, 1932	Bali	0	?	0	?
perparva Jackson, 1927	Trinidad	0	4	0	0
centralis Denis, 1931	Costa Rica	0	?	0	0
————, Winter, 1967	Peru	0	4	0	0
Ocelli 5 + 5					
yamorensis Uchida, 1949	New Guinea	0	?	0	0
richardi Denis, 1924	Monaco	0	4	+	0
pilicauda Handschin, 1927	Costa Rica	0	?	+	0

to the subgenus *Clavisotoma* would have also to be included in *Varisotoma*. This would not only lead to a disruption of *Clavisotoma,* but would also result in a highly artificial classification. Consequently, I would suggest to discard the genus *Varisotoma* as superfluous and unnatural.

The species of *Proisotoma (Clavisotoma)* sensu novo.

The species can be suitably arranged in some groups, based on the number of ocelli, presence of tibiotarsal tenent hairs, the number of retinacular teeth, presence of internal tooth to the unguis and terminal filament to the unguiculus.

A synoptic table is given on the preceding page.

The drawing of *Proisotoma schoetii,* Yosii, 1939, nec Dalla Torre, 1895, (= *P. yosii* Stach) gives the impression that the dens should be hairy in its antero-proximal part.

P. fitchi Denis and *centralis* Denis have been found in Brasil by Arlé, 1939. The known distribution of *fitchi* was further extended by Massoud and Rapoport, 1968, who identified this species among material from Tucuman.

A specimen of the original series of *P. inaequalis* (Schäffer) has been studied by Linnaniemi, 1912: 126—127. He noted a number of differences with *borealis* (Axelson) but did not mention as such the number of retinacular teeth, neither the form of the unguiculus. For this reason I suppose them to be as in *borealis.*

I have long hesitated whether or not to include *P. ultonica* Carpenter, 1911. According to the drawings, the dens has, as the author states, "numerous small tubercles" — that is, no humps. Nevertheless, *ultonica* is compared by its author with *borealis* and *inaequalis.*

Gama, 1964, states to have refound *P. richardi* in Portugal. The Portuguese material, however, differed in having 6+6 ocelli. Basing herself on the sentence in Denis' original description "je ne puis mettre en évidence plus de 5 omma...", Gama concluded that the sixth ocellus had escaped the attention of Denis. I do not think that this is correct, especially as Denis had at his disposition "très nombreux exemplaires". However, even if we accept Gama's opinion of *richardi* having 6+6 ocelli, there can be no danger of synonymy, as is evident from an inspection of the table of species having that number of eyes, given above.

Literature

Arlé, R., 1939, Quelques Collemboles de l'Etat d'Espirito Santo (Brésil). *Physis* 17: 125—131.

Delamare Deboutteville, Cl., 1953, Collemboles du Kilimandjaro récoltés par le Dr. George Salt. *Ann. Mag. nat. Hist.* [12] 6 (71): 817—831.

Denis, J. R., 1931, Contributo alla conoscenza del "Microgenton" di Costa Rica. II. Collemboles de Costa Rica avec une contribution au species de l'ordre. *Boll. Lab. Zool. gen. agr. R. Scuola Agric. Portici* 25: 69—170.

Gama, M. M. Da, 1964, Colêmbolos de Portugal continental. p. 1—252. Coimbra.

Linnaniemi, W. M., 1912, Die Apterygotenfauna Finlands. II. Spezieller Teil. *Acta. Soc. Sci. fenn.* 40 (5): 1—361, pls 1—16.

Massoud, Z. & E. H. Rapoport, 1968, Collemboles isotomides d'Amérique du Sud et de l'Antarctide. In: Cl. Delamare Deboutteville & E. H. Rapoport ed., Biologie de l'Amérique australe 4: 307—337. Paris.

Palissa, A., [1964], Apterygota - Urinsekten. In: P. Brohmer, P. Ehrmann & G. Ulmer ed., Die Tierwelt Mitteleuropas. Insekten. 4 (1a): 1—407. Leipzig.

RAPOPORT, E. H. & S. MAÑO, 1969, Colembolos de Venezuela. I. *Acta biol. venez.* 6 (3/4) : 117—128.

SALMON, J. T., 1964, An index to the Collembola. *Bull. R. Soc. N.Z.* 7 (1,2): 1—144, 145—644.

STACH, J., 1947, The apterygotan fauna of Poland on relation to the world-fauna of this group of insects. Family: Isotomidae. *Acta monogr. Mus. Hist. nat.* 1: 1—488, pls 1—53.

WINTER, CHR., 1967, Beiträge zur Kenntnis der neotropischen Collembolenfauna. I Isotomidae. (2. Teil). *Senckenberg. biol.* 48 (1): 37—69.

YOSII, R., 1966, On some Collembola of Afghanistan, India and Ceylon, collected by the Kuphe-expedition, 1960. *Results Kyoto Univ. scient. Expedition Karakoram Hindukush, 1955* 8: 333—405.

Further notes on Cheletomorpha lepidopterorum (Acari, Cheyletidae), transported by Lepidoptera

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In *Beaufortia* (1964) I discussed a number of observations relating the transport of the mite *Cheletomorpha lepidopterorum* (Shaw, 1794) by the intermediacy of Lepidoptera.

Prior to my previous paper, only a few cases of this transport were recorded. Indeed it seemed quite incidental, and so (1964 : 57) I joined VITZTHUM (1941 : 574) in considering the phenomenon as "phoresy" and not as "symphorism". The interpretation of symphorism, as derived from DEEGENER'S ideas by VITZTHUM (1941 : 573) reads as follows: "Symphorium. Eine Tierart siedelt sich, ohne Parasit zu werden, auf der Körperoberfläche einer anderen Tierart an, ohne dass ein mutualistisches (reziprokes) Verhältnis zwischen Träger und Getragenem zustande kommt."

The fact that — including my addendum (1964 : 59) — I could record six cases in all (from The Netherlands and from England) of transport by the moth *Charanyca* [now *Caradrina*] *clavipalpis* (Scop.), and that in the present paper I can mention four more cases found in England, has lead me to the conclusion that it is correct to consider these transports as symphorism. It is true that is no absolute condition *which* species of moth supplies the transport, but both *Caradrina clavipalpis* and *Cheletomorpha lepidopterorum* use to live in the same biotope and therefore, normally, it will be *Caradrina clavipalpis* which brings the mite from one suitable locality to another, where both will live on side by side. This is in accordance with the condition for a true symphorism, that both the transporting and the transported species occur in the same biotope.

Cheletomorpha lepidopterorum attaches itself to the scales of the moth by an adhesive substance. The scales of many Lepidoptera are suitable for this purpose and so it may occur that the mite incidentally makes use of another moth species at rest in its biotope. This is the case for most of the observed transports by other moths than *Caradrina clavipalpis*. These exceptions do not alter the normally exist-